

Remarks:

Claims 13-26 are now pending in this application. Applicants have canceled claims 1-12 and presented new claims 13-26 to clarify the present invention. Applicants respectfully request favorable reconsideration of this application.

Applicants submit here with a duplicate copy of form PTO-1449 originally filed with the Information Disclosure Statement submitted September 18, 2001 as evidenced by the attached copy of a postcard date stamped by the mail room of the U.S. Patent and Trademark Office. Applicants respectfully request that the Examiner return to the undersigned a copy of the form PTO-1449 indicating that the references have been considered. In view of the above, Applicants submit that the references should be listed on any patent granted from this application. Furthermore, in view of the evidence submitted herewith, the Information Disclosure Statement was complete as filed and no fee associated with the filing of form PTO-1449 should be due.

Applicants agree with the use of the Abstract from the published PCT application as the Abstract of the Disclosure at issuance.

The objections to the claims are no longer relevant since the language objected to by the Examiner no longer appears in the claims. In particular, the claims now include only American English. Also, Applicants have clarified the language concerning the impurities in the alloy. The level of impurities is normal for an alloy used in a reactor. In view of the above, Applicants

respectfully submit that the objections to the claims have been overcome and request withdrawal of the objections.

The present invention as recited in newly presented independent claim 13 includes a zirconium-based alloy suitable for use in a corrosive environment where it is subjected to increased radiation. The alloy includes zirconium having a quality and impurity level suitable for use in reactors and including 0.65-1.6 percent by weight Nb, 0.3-0.6 percent by weight Fe, and 0.65-0.85 percent by weight Sn.

The amount of tin in the alloy was recited by original claim 2. Also, the amount of niobium in the alloy is supported by the specification at page 7, line 32.

As discussed in the Background of the Invention, the properties of zirconium based alloys are quite complicated. This is particularly the case with zirconium-based alloys suitable for use in corrosive environments, such as in a nuclear reactor, where an alloy will be subjected to radiation. The environment in this setting is very complex, with many variables acting on the components made of the alloys.

The qualities of alloys for use in the nuclear reactor environment depend upon the alloying elements and amounts of alloying elements. Much research has been carried out to develop the best alloy. Selecting the proper alloying elements and amounts is very important. For example, as discussed in the specification, the presence of secondary phase particles has an influence on the properties of an alloy.

As evident from this description, the amounts of alloying elements are small, such as on the order of less than one percent by weight. Traditionally, the standard alloys Zircaloy-2 and Zircaloy-4 have been used for components in nuclear fuel reactors. As a result, small changes in the amounts of the elements can result in large changes in the properties of an alloy. As exemplified by the cited references, many attempts have been made to improve the qualities of alloys.

The inventors of the present invention have found that it is important to have a relatively high iron content, along the lines of the 0.3-0.6 percent by weight recited in claim 13. Additionally, the inventors have found that corrosion resistance of an alloy is improved if the niobium content is about 0.65. However, the niobium content should be less than about 1.6 since higher amounts of niobium can result in increasing amounts of particles of β -niobium, which can reduce the corrosion resistance. Furthermore, the inventors have found that a tin content in the unexpectedly small range of about 0.65-0.85 in combination with the Nb and Fe in the ranges described above results in improved corrosion properties while providing components made of the alloy with very good physical and mechanical properties.

The Examiner rejected claims 1, 2, and 4-10 under 35 U.S.C. 102(e) as being anticipated by U.S. patent 6,125,161 to Isobe et al. The Examiner rejected claims 1 and 5-10 under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 5,940,464 to Mardon et al. The Examiner rejected claims 1, 2, and 4-10 under 35 U.S.C. 102(b) as being anticipated by U.S. patent 5,985,211 to Jeong et al. The Examiner rejected claims 1, 2, and 4-10 under 35 U.S.C. 102(b) as

being anticipated by U.S. patent 5,211,774 to Garde et al. The Examiner rejected claims 1-9 under 35 U.S.C. 102(b) as being anticipated by Japanese patent document JP 08067954 A to Nomoto et al. The Examiner rejected claims 1-6 and 8 under 35 U.S.C. 102(b) as being anticipated by Japanese patent document JP 02159336 A to Anada et al. The Examiner rejected claims 1, 2, and 4-10 under 35 U.S.C. 103(a) as being unpatentable over Isobe. The Examiner rejected claims 1 and 5-10 under 35 U.S.C. 103(a) as being unpatentable over Mardon. The Examiner rejected claims 1, 2, and 4-10 under 35 U.S.C. 103(a) as being unpatentable over Jeong. The Examiner rejected claims 1, 2, and 4-10 under 35 U.S.C. 103(a) as being unpatentable over Garde '774. The Examiner rejected claims 1-5 under 35 U.S.C. 103(a) as being unpatentable over Nomoto. The Examiner rejected claims 1-6 and 8 under 35 U.S.C. 103(a) as being unpatentable over Anada. The Examiner rejected claim 3 under 35 U.S.C. 103(a) as being unpatentable over Isobe in view of U.S. patent 5,254,308 to Garde et al. The Examiner rejected claims 3 and 4 under 35 U.S.C. 103(a) as being unpatentable over Mardon in view of Garde '308. The Examiner rejected claim 3 under 35 U.S.C. 103(a) as being unpatentable over Jeong as in view of Garde '308. The Examiner rejected claim 3 under 35 U.S.C. 103 (a) as being unpatentable over Garde '774 in view of Garde '308. The Examiner rejected claim 10 under 35 U.S.C. 103 (a) as being unpatentable over Nomoto in view of Garde '308. The Examiner rejected claims 7, 9, and 10 under 35 U.S.C. 103(a) as being unpatentable over Anada in view of Garde '308. The Examiner rejected claims 11 and 12 under 35 U.S.C. 103(a) as being unpatentable over Isobe in view of Garde '308 and in view of U.S. patent 5,790,623 to Van Swam. The Examiner rejected claims 11 and 12 under 35 U.S.C. 103(a) as being unpatentable over Mardon in view of Garde '308 and in view of Van Swam. The Examiner rejected claims 11 and 12 under 35 U.S.C. 103(a) as being unpatentable over Jeong in

view of Garde '308 and in view of Van Swam. The Examiner rejected claims 11 and 12 under 35 U.S.C. 103(a) as being unpatentable over Garde '774 in view of Garde '308 and in view of Van Swam. The Examiner rejected claims 11 and 12 under 35 U.S.C. 103(a) as being unpatentable over Nomoto in view of Garde '308 further in view of Van Swam. The Examiner rejected claims 11 and 12 under 35 U.S.C. 103(a) as being unpatentable over Anada in view of Garde '308 and further in view of Van Swam.

Applicant submits herewith a certified translation of the priority document. The priority application was filed December 11, 1998. Therefore, the anticipate and obviousness rejections based upon Isobe et al., whether considered along or in combination with one or more secondary references, are no longer relevant and should be withdrawn.

Mardon does not disclose the present invention since, among other things, Mardon does not disclose an alloy that includes 0.65-0.85 percent by weight of tin, as stated in the Abstract, among other locations, and as described by the Examiner in paragraph 8 of the office action. Rather, Mardon discloses an alloy that includes a tin content below 0.6 percent by weight.

Jeong et al. does not disclose the present invention since, among other things, Jeong et al. does not disclose an alloy that includes 0.65-1.6 percent by weight of niobium. Rather, Jeong et al. discloses an alloy that includes 0.3-0.6 percent by weight of niobium, as described at col. 4, lines 19-20, of Jeong et al. and as described in paragraph number 9 of the office action. Additionally, none of the example alloys disclosed in the chart in col. 7 of Jeong et al. remotely discloses the combination of Sn, Nb, and Fe in the claimed ranges.

Garde et al. does not disclose the present invention since, among other things, Garde et al. does not disclose an alloy that includes 0.65-1.6 percent by weight of niobium. Rather, Garde et al. discloses an alloy that includes at most 0.6 percent by weight of niobium, as described in the Abstract and at col. 2, line 68, through col. 3, line 1, of Garde et al. and as described in paragraph number 10 of the office action. Additionally, Garde et al. does not disclose an alloy having a tin content of 0.65-0.85 percent by weight. Rather, Garde et al. discloses an alloy having a tin content of 0.8-1.2 percent by weight.

Nomoto et al. does not disclose the present invention since, among other things, Nomoto et al. does not disclose an alloy that includes percent by weight of . Rather, Nomoto et al. discloses an alloy that includes 0.05-0.30 percent by weight of iron, as described in the "Constitution" of Nomoto et al. and as described in paragraph number 10 of the office action.

Anada et al. does not disclose the present invention since, among other things, Nomoto et al. does not disclose an alloy that includes percent by weight of . Rather, Nomoto et al. discloses an alloy that includes 0.05-0.30 percent by weight of iron, as described in the "Constitution" of Nomoto et al. and as described in paragraph number 10 of the office action.

In view of the above, none of Mardon, Jeong et al., Garde et al., Nomoto et al. or Anada et al. discloses all elements of the present invention as recited in newly presented claims 13-26. Since none of Mardon, Jeong et al., Garde et al., Nomoto et al. or Anada et al. discloses all elements of the present invention as recited in newly presented claims 13-26, the present invention, as recited in

newly presented claims 13-26, is not properly rejected under 35 U.S.C. § 102(b). For an anticipation rejection under 35 U.S.C. § 102(b) no difference may exist between the claimed invention and the reference disclosure. See *Scripps Clinic and Research Foundation v. Genentech, Inc.*, 18 U.S.P.Q. 841 (C.A.F.C. 1984).

Along these lines, anticipation requires the disclosure, in a cited reference, of each and every recitation, as set forth in the claims. See *Hodosh v. Block Drug Co.*, 229 U.S.P.Q. 182 (Fed. Cir. 1986); *Titanium Metals Corp. v. Banner*, 227 U.S.P.Q. 773 (Fed. Cir. 1985); *Orthokinetics, Inc. v. Safety Travel Chairs, Inc.*, 1 U.S.P.Q.2d 1081 (Fed. Cir. 1986); and *Alzo N.V. v. U.S. International Trade Commissioner*, 1 U.S.P.Q.2d 1081 (Fed. Cir. 1986).

None of Mardon, Jeong et al., Garde et al., Nomoto et al. or Anada et al. considered alone suggests the present invention since, as described above, none of these references suggests the ranges of materials recited in the claims. As can be seen in the references and in the present invention, the amounts of the alloying materials are small. The alloying elements and amounts of the alloying elements provide the alloy with certain characteristics. Changing the amounts of the alloying elements alters the properties of the resulting alloy. As a result, it is not obvious to alter the small amounts of alloying elements since this would alter the characteristics of the alloy from those that any particular reference describes. Combining any of the above references with a secondary reference that suggests a particular component of a nuclear reactor does not suggest the present invention since, as already discussed, the references do not suggest the particular combination of alloying elements in the ranges discussed above.

The cited references suggest different alloy compositions to produce alloys having different characteristics. Along these lines, each reference suggests a composition and a set of described advantageous properties. One skilled in the art would not arbitrarily combine references to alter the combination of an alloy as suggested by the Examiner. To do so would alter the properties of the alloy as described in any of the references. It is only in hindsight with knowledge of the present invention that one skilled in the art would pick and choose among the alloying elements and ranges of these elements from the cited references. Such hindsight is impermissible in a rejection. *In re Bond*, 15 U.S.P.Q.2d 1566 (Fed. Cir. 1990).

Furthermore, without knowledge of the present invention, it is not apparent that one skilled in the art would be motivated to alter the ranges of alloying elements in any of the cited references. It would require undue experimentation to mix and match the amounts of the alloying elements and determine the properties of the resulting alloy. Even if one skilled in the art were to experiment and alter the composition of any of the alloys suggested by the references, there is no suggestion that they would arrive at the composition of the present invention. The number of references cited by the Examiner indicates the number of alloys having different compositions that exist and that have different properties. The present invention provides a new composition not suggested by the cited references and that has new and different properties.

None of the references discloses or suggests the combination of alloying elements in the ranges of amounts recited in the claims. Even if some of the references disclose or suggest that a range of concentration of one alloying element that might slightly overlap one of the ranges recited in the claims, the other elements are either not present or present in a concentration range

that does not overlap at all with the ranges recited in the claims. All of the references attach significance to the concentration ranges of alloying elements. Altering the concentration ranges by picking and choosing various elements and concentration ranges as suggested by the Examiner is contrary to the teachings of each of the references. Each reference attaches significance to the concentration ranges of the alloying elements and the resulting characteristics of the resulting alloy. To alter the ranges would alter characteristics of the alloy. As a result, no motivation exists to alter the alloys as suggested by the Examiner. Such motivation is required. *In re Lee*, 61 U.S.P.Q.2d 1430 (Fed. Cir. 2002).

Furthermore, the specification of the present application attributes significance to the concentration ranges and the characteristics of the resulting alloy. For example, the Summary of the Invention is replete with descriptions of the significance of the concentration ranges. Although none of the references discloses or suggests the combination of alloying elements and concentration ranges recited in the claims, even if one concentration range of one element partially overlaps with or lies within one of the ranges in the one of the cited references, the present invention is still patentable since the specification describes unexpected properties in ranges claimed. *In re Geisler*, 43 U.S.P.Q.2d 1362 (Fed. Cir. 1997).

In view of the above, the references relied upon in the Office Action, whether considered alone or in combination, do not disclose or suggest patentable features of the present invention. Therefore, the references relied upon in the Office Action, whether considered alone or in combination, do not anticipate or render obvious the present invention. Accordingly, Applicants respectfully request withdrawal of the rejections based upon the cited references.

In conclusion, Applicants respectfully request favorable reconsideration of this case and early issuance of the Notice of Allowance.

In the event that the Examiner believes that an interview would serve to facilitate the prosecution of this application, Applicants respectfully urge the Examiner to contact the undersigned at the telephone number listed below.

The undersigned hereby authorizes the Commissioner to charge any insufficient fees or credit any overpayment associated with this communication to deposit account no. 19-5127, Order # 19378.0011.

Respectfully submitted,

Date:

7-17-02



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